(j) The cargo pumping/piping systems must be arranged independently from all other systems. Cargo transfer pumps and piping (including fill, discharge, vent, and sounding piping) must not be located in or pass through any accommodation, service, or machinery spaces.

§ 111.106–5 Cable and wiring.

(a) Cable and wiring in hazardous locations must meet the cable construction and testing provisions of IEEE 1580; UL 1309; MIL–DTL–24640C; MIL–DTL–24643C; or IEC 60092–350:2008 and IEC 60092–353:2011 (incorporated by reference, see § 110.10–1), including the respective flammability tests contained therein, and must be of a copper-stranded type.

(b) Type MC cables, when used, must meet the requirements in § 111.60–23 of this part.

(c) For intrinsically safe systems under the standards cited in § 111.106–3(b)(1) and (b)(2) of this subpart, the wiring methods must meet Section 504.30 of NFPA 70 (incorporated by reference, see § 110.10–1). For intrinsically safe systems under the standards cited in § 111.106–3(b)(3) of this subpart, the installation and wiring must meet Clause 7, except for Clause 7.3.1, of IEC 60092–502 (incorporated by reference, see § 110.10–1).

§ 111.106–7 Classification of adjacent spaces with access to hazardous locations.

(a) Hazardous location classification of adjacent spaces must comply with Clause 12.5 of either API RP 500 or API RP 505 (incorporated by reference, see § 110.10–1).

(b) A differential pressure-monitoring device or a flow-monitoring device, or both, must be provided for monitoring the pressurization of spaces having an opening into a more hazardous zone. A running fan motor or a fan-rotation monitoring device indicator is insufficient to satisfy this requirement.

(c) During initial startup, or after shutdown of the pressurization or ventilation system, and regardless of the classification of the hazardous location, the space must be ventilated or purged, followed by pressurization or ventilation of the space, before any electrical apparatus within the space may be energized. The atmosphere is considered non-hazardous when the concentration of explosive gases or vapors is below 30 percent of the lower explosive limit at all points in the space, equipment enclosures and vent ducts.

(d) Only electrical equipment and devices that are necessary for the operational purposes of the space may be installed in spaces made non-hazardous by the methods allowed in this section.

§ 111.106–9 Classification of flammable or combustible cargo storage and handling locations.

(a) This section applies to locations surrounding the storage and handling locations of flammable and combustible liquid cargoes with closed-cup flashpoints not exceeding 60 °C (140 °F).

(b) The following are Class I Special Division 1 (Zone 0) locations:

(1) Enclosed areas containing devices handling cargoes, such as cargo handling or pump rooms, except as modified by § 111.106–13 of this subpart.

(2) The interiors of cargo storage tanks, slop tanks, any pressure-relief pipework or other venting systems for cargo and slop tanks, pipes and equipment containing the cargo or developing flammable gases or vapors.

(3) Areas on an open deck, or a semi-enclosed space on an open deck, within 0.5 meters of any cargo storage tank outlet, cargo gas or vapor outlet, ullage opening, sounding pipe, cargo tank opening for pressure release, or cargo storage tank pressure or vacuum valve provided to permit the flow of small volumes of gas or vapor mixtures caused by thermal variation.

(4) Areas on an open deck, or semi-enclosed spaces on open deck, within 0.5 meters of any cargo handling or pump room entrance, or cargo ventilation handling or pump room ventilation inlet or outlet.

(5) Areas in the vicinity of any cargo vent outlet for free flow of large volumes of vapor mixtures during cargo loading and discharging of storage tanks, within a vertical cylinder of unlimited height, of 1 meter radius centered upon the vent outlet, and within a hemisphere of 1-meter radius below the vent outlet.

(6) Areas in the vicinity of any cargo high-velocity vent outlet during cargo loading and discharging of storage tanks, within a vertical cylinder of unlimited height, of 0.5 meters radius centered upon the vent outlet, and within a hemisphere of 0.5 meters radius below the vent outlet.

(c) The following are Class I Division 1 (Zone 1) locations:

(1) Areas on an open deck, or a semi-enclosed space on an open deck, that are 2.5 meters beyond the Class I Special Division 1 (Zone 0) areas cited in paragraphs (b)(3) and (4) of this section.

(2) Areas on an open deck, or a semi-enclosed space on an open deck, that are within 3 meters of any cargo manifold valve, cargo valve, cargo pipe flange, cargo tank hatch, sight port, tank cleaning opening, and opening into cofferdams or other Zone 1 spaces.

(3) Regardless of the level of natural ventilation, areas on an open deck above the tank top of each cargo tank extending out 3 meters beyond the tank top boundaries of each cargo tank, up to a height of 2.4 meters above the deck.

(4) Areas on an open deck within spillage coamings surrounding cargo manifold valves extending 3 meters beyond the boundaries of the spillage coamings, up to a height of 2.4 meters.

(5) A void space or an enclosed space immediately above, below or adjacent to an integral cargo storage tank, including cofferdams and permanent (for example, segregated) ballast tanks adjacent to integral cargo storage tanks.

(6) A hold space containing an independent cargo storage tank.

(7) Compartments for cargo transfer hoses.

(8) Enclosed or semi-enclosed spaces in which pipes containing cargoes are located.

(9) Areas 7.5 meters beyond the cylinder and 7.5 meters beyond the hemisphere of the Class I Special Division 1 (Zone 0) hazardous locations cited in paragraph (b)(5) of this section.

(10) Areas 5.5 meters beyond the cylinder and 5.5 meters beyond the hemisphere of the Class I Special Division 1 (Zone 0) hazardous locations cited in paragraph (b)(6) of this section.

(d) The following are Class I Division 2 (Zone 2) locations:

(1) Areas on an open deck, or a semi-enclosed space on an open deck, that are 1.5 meters beyond the Class I Division 1 (Zone 1) areas cited in paragraphs (c)(1) through (4) of this section.

(2) Areas 1.5 meters beyond the cylinder and 1.5 meters beyond the hemisphere of the Class I Special Division 1 (Zone 1) hazardous locations cited in paragraph (c)(9) of this section.

(3) Areas 4 meters beyond the cylinder and 4 meters beyond the hemisphere of the Class I Division 1 (Zone 1) hazardous locations cited in paragraph (c)(10) of this section.

(4) Enclosed spaces beyond the open deck areas cited in paragraph (c)(3) of this section that are below the level of the main deck and have an opening onto the main deck or at a level less than 0.5 meters above the main deck, unless—

(i) The entrances to such spaces, including ventilation inlets and outlets, are situated at least 5 meters from the closest integral cargo tank bulkhead and at least 10 meters measured horizontally from any integral cargo tank outlet or gas or vapor outlet; and

(ii) The spaces are mechanically ventilated.

§ 111.106–11 Classification of storage and handling locations of heated combustible liquid cargoes.

(a) This section applies to locations surrounding the storage and handling of combustible liquid cargoes with closed-cup flashpoints exceeding 60 °C (140 °F).

(b) The interiors of independent storage tanks and integral tanks containing cargoes with closed-cup flashpoints of 60 °C (140 °F) or higher and heated to within 15 °C of their flashpoint are considered Class I Special Division 1 (Zone 0). The hazardous locations in §111.106–9 of this subpart apply.

§ 111.106–13 Cargo handling devices or cargo pump rooms handling flammable or combustible cargoes.

(a) This section is applicable to enclosed areas containing devices handling flammable or combustible liquid cargoes with closed-cup flashpoints not exceeding 60 °C (140 °F).